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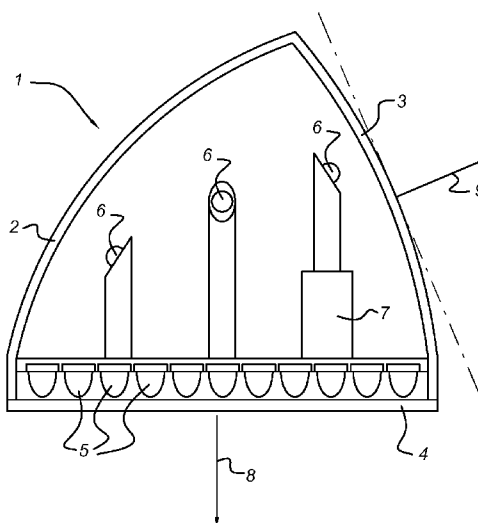
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(54) Title: LUMINAIRE WITH TWO INDEPENDENT LIGHT SOURCES FOR REDUCING CONTRAST AND DISCOMFORT GLARE

Fig. 1



(57) Abstract: The invention relates to a luminaire (1) comprising a housing provided with a first light exit window (4) and a first light source (5) arranged for functional lighting an object through the first light exit window. Thereto the first light source is arranged to radiate a light beam in a direction to the object. In order to reduce perceived glare to people in a neighboring area of the luminaire the housing is provided with a translucent portion (3) and comprises a second light source (6) arranged to illuminate the translucent portion according to a second light beam direction non parallel to the first light beam direction. The first and second light sources can be LEDs.

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- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

LUMINAIRE WITH TWO INDEPENDENT LIGHT SOURCES FOR REDUCING CONTRAST AND DISCOMFORT GLARE

FIELD OF THE INVENTION

The invention relates to a luminaire and a lighting system.

BACKGROUND OF THE INVENTION

A luminaire comprising a housing is typically provided with a light exit window and a light source arranged for functional lighting of an object or a surface via the light exit window.

Such luminaires are used for functionally illuminating such objects or surfaces in indoor or outdoor applications. Functional lighting provide safety, security and comfort on locations where light is required for example on a desk, in livings, streets parks, parking's square and other public places.

But functional light may be perceived as glary due to the significant contrast that may exist between the light output of the luminaire and the environment. Moreover some side lights may increase this glare effect.

This perception can lead to discomfort glare.

Conventionally this discomfort is reduced by adjusting the performance of the luminaire leading typically to less efficient lighting solutions.

SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide a luminaire which has a reduced discomfort glare.

According to a first aspect of the invention this and other objects are achieved by a luminaire comprising a housing provided with a first light exit window and a first light source arranged for functional lighting a surface according to a first light beam direction via the first light exit window, wherein the housing is provided with a translucent portion and a second light source arranged to illuminate the translucent portion according to a second light beam direction non parallel to the first light beam direction. The first and second light sources can be, for example, LEDs, or any kind of light source (e.g. incandescent lamp(s), fluorescent lamp(s)).

The invention is based on the insight that the lit shading of the luminaire via the translucent portion illuminated by the light radiated by second light source reduces the contrast between light source radiating the beam in to the direction of the object and the environment, which may lead to reduction of discomfort glare. When this solution is applied the performance of the luminaire can be increased as discomfort glare is reduced. This increase in performance may reduce total costs of ownership and reduce energy consumption.

The illumination of the translucent portion can also be used for creation of esthetic effects.

In this application translucent means opaque, opal, stained, diffusing or frosted. The lit shading may create an ambiance of glowing street light.

It is also possible to use the lit shade of the luminaire as guidance light besides the functional lighting. Furthermore the lit shading of the luminaire can be used in communication to people, for example, in area marking by using different colors of the lit shading in the luminaires.

In a further embodiment the translucent portion is arranged such that a normal of a tangential plane of the translucent portion is divergent with the direction of the light beam. This arrangement enables that the first beam direction can be arranged non parallel to the second beam direction.

In a further embodiment the translucent portion is a circumferential portion of the housing. The circumferential portion can for example a circumferential wall of the housing.

In a further embodiment the housing comprises a second window provided with the translucent portion.

In a further embodiment the luminaire comprises a control circuit provided with a first input for receiving a control signal for driving the first and second light sources.

The control signal can be adjusted such that, for example, the first LEDs are controlled for functional lighting and the second LEDs for lit shading.

In a further embodiment the luminaire is provided with a light detector arranged for generating a signal dependent on a light level of ambient light and the control circuit is provided with a second input for receiving the generated signal and the control circuit is arranged to drive the second light source dependent on the generated signal. The light detector detects a light level of the environment and generates a signal, that can be used to control, for example, the first and second LEDs dependent on the light level or color of the ambient light.

In a further embodiment the light detector is provided with a color filter in order to generate the signal dependent on a light level of a portion of the ambient light having a wavelength in a predefined range. In this arrangement the generated signal can be made dependent on the color of the environment.

In a further embodiment wherein the light detector is a low resolution camera. In this arrangement the generated signal can be made dependent on the intensity or color of an object in an image of the environment of the luminaire.

In a further embodiment the second light source is an RGB-LED and the control circuit is arranged to drive the RGB-LED at a certain color point. In this arrangement the color of the light radiated by the RGB-LED can be adjusted to a certain color to adapt for example the lit shading of the luminaire. This feature can be used for example to assign a certain color of the lit shading for certain areas or street. Or the use a certain color as an indication or guidance.

In a further embodiment the control circuit is arranged to adjust the color point of the RGB-LED dependent on the generated signal of the light detector. In this arrangement a certain color of light generated by the second LED can be adjusted dependent on an ambient light level.

A different embodiment of the invention relates to a lighting system to a comprising a plurality of luminaires according to claim 1, wherein the lighting system comprise a control device arranged for generating control signals for controlling the respective first and second light sources in the respective luminaires. In this lighting system the control device can be used to control either the first or second LED or both of the individual luminaires in the lighting system.

In a further embodiment of the lighting system the control device is arranged to generate a first control signal for a first group of the plurality luminaires and to generate a second control signal for a second group of the plurality of luminaires, wherein the control device is further arranged to generate a first and second control signals to drive the second light sources in the luminaires in the first group for generating a first light output and to drive the second light sources in the second group for generating a second light output, the second light output having lighting features different than the lighting features of the first light output. In this arrangement the control device can be used to control the light output of the second LEDs in the first and second group, wherein the light output of one of the second LED of the luminaire in a group is equal to the light output of the other second LED of the other luminaires in the group.

In a further embodiment of the lighting system the second light sources of the luminaire of the first and the second groups comprise RGB-LEDs and the control device is further arranged to generate, respectively, first and second control signals to drive the RGB-LEDs in the first group at first color point and the second RGB-LED in the second groups at a second color point, the second color point being different than the first color point. In this arrangement the color of the light radiated by RGB-LEDs of the first group can be adjusted to be different than the color of the light radiated by the RGB-LEDs of the second group. This arrangement can be used for assigning different color shadings to luminaires in certain different areas lighted by the luminaires of the different groups.

These and other features and effects of the present invention will be explained in more detail below with reference to drawings in which a preferred and illustrative embodiments of the invention are shown. The person skilled in the art will realize that other alternatives and equivalent embodiments of the invention can be conceived and reduced to practice without departing from the scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a schematic illustration of a luminaire,

Fig. 2 shows a schematic diagram of a luminaire,

Fig. 3 shows a schematic diagram of a lighting system according to a first embodiment, and

Fig. 4 shows a schematic diagram of a lighting system according to a second embodiment.

DETAILED DESCRIPTION OF THE INVENTION

In the figures like numerals refer to similar components.

Fig. 1 shows a schematic view of a luminaire 1. The luminaire comprises a housing provided with a circumferential portion, i.e. a wall 3 provided with a first light exit window. The first light exit window may comprise a transparent plate 4, for example, a glass or PMMA plate. The circumferential wall 3 may comprise a translucent material. Furthermore, the luminaire 1 comprises a number of first light sources, for example, LEDs 5. This number can be for example 16 or 32, sufficient for functional lighting and a number of second light sources, for example, LEDs 6. This number can be for example three respective LEDs for generating respectively red, green or blue light. The first LEDs 5 are arranged in the housing close to the inner side of the glass plate 4. The first LEDs can be white LEDs for

radiating white light. The second LEDs 6 are arranged in the housing and distributed along the peripheral wall 3. The second LEDs are arranged to illuminate the translucent peripheral wall 3. The second LEDs can be red, green or blue LED for radiating red, green or blue light. Alternatively the second LEDs can be white LEDs. The translucent peripheral wall 3 can also comprise color filters. Furthermore, the luminaire 1 can comprise a control circuit 7 provided with a first input 21 for receiving a control signal for driving the first and second LEDs. The first LEDs 5 of the luminaire can be used for functional lighting of an object or a surface, thereto the first LEDs 5 are arranged to form a light beam 8 directed to the object or the surface. The second LEDs 6 can be used as lit shade of the luminaire thereto the second LEDs 6 are arranged to illuminate the translucent peripheral wall 3. Furthermore, the first LEDs are arranged to radiate the light beam in a direction divergent to the normal 9 of a tangential plane of the translucent peripheral wall 3 or non parallel with light beams radiated by the second LEDs 6 to the translucent peripheral wall 3. The luminaires 1 can be placed at public places for example streets, parking's, squares, bridges and statues. The luminaires can also placed within buildings and houses, for example in auditorium, halls and livings.

Fig.2 shows a diagrammatic circuit of the luminaire. The first and second LEDs 5,6 can be electrically connected with a respective first and second output 22,23 of the control circuit 7. The first and second LED 5,6 can be connected to the control circuit 7 either in parallel or series or a combination of both. In this embodiment the first and second LED 5,6 are connected in parallel. The control circuit 7 can be connected to a mains or an other power supply via inputs 28,29.

In operation, the control circuit 7 drives the first LEDs 5 to generate functional light to illuminate an object through the transparent glass plate 4. Furthermore, the control circuit drives the second LEDs 6 of the luminaire to generate light to illuminate the translucent peripheral wall 3 and thereby create a lit shade on the luminaire 1. The lit shade can be used to create a certain ambience in the lighted environment or to obtain certain esthetic effects . In this arrangement the control circuit 7 can adjust the luminance of the lit shade with respect to the luminance of the functional lighting at optimal performance of the first LEDs 5 by adjusting the power to the second LEDs 6. In this way, the lit shade reduces the contrast between the functional lighting and the environment, thereby the perceived discomfort glare of the first LEDs 5 may be reduced.

In an embodiment the luminaire 1 may be provided with a light detector 25 that can be provided with a color filter 26 for generating a signal dependent on a light level or color of ambient light. Furthermore, the control circuit 7 may be provided with a second

input 24 for receiving the generated light level signal. The control circuit 7 may be arranged to adjust to power to the second LEDs 6 dependent on the received light level or color signal. In this way the contrast between the functional lighting and the environment can be reduced automatically dependent on the light level and/or color of the environmental light.

In an embodiment the light detector can be a image capturing device, for example a camera for imaging an object in the object space of the camera. The camera can be provided with an image recognition device for recognizing the object in the captured image and generating a color signal representing a color of the object .

In an embodiment the second LED may comprise RGB-LEDs. An RGB-LED consist of three respective LEDs integrated in a single device for radiating respective red, green and blue light. The control circuit can be further arranged to drive the RGB-LED at a certain color point. In an embodiment the control circuit can drive the RGB-LED dependent on the received light level signal of the light detector. Furthermore, the control circuit can be arranged to drive RGB-LED at a color point in accordance with the generated color signal.

Fig. 3 shows a lighting system comprising a number of luminaires in this embodiment the number of luminaires is six, but in practice this number can be extended to 10 or 100. The luminaires are similar as described above with respect to Figs 1 and 2. Furthermore, the lighting system comprises a control device 37. A first output 38 of the control device 37 is electrically connected to the input 21 of the luminaires for receiving the control signal. In operation, the control device 37 generates the control signal for each of the luminaires 31-36 for controlling the first and second LEDs in the respective luminaires.

In an embodiment the luminaires can be separated in two or more groups, each group comprises at least one luminaire.

Fig. 4 shows a lighting system comprising a first group consisting of three luminaires 31,33,35 and a second group consisting of the luminaires 32, 34, 36. The luminaires are similar as described above with respect to Figs 1 and 2. Furthermore, the control device comprises a first output 48 connected to the first group of luminaires 41,43,45 and a second output 49 connected to the second group of luminaires 42,44,46. The control device 47 can be arranged to generate a first control signal to drive the second LEDs in the luminaires 41,43,45 in the first group to generate light at a first light output and to drive the second LEDs of the luminaires 42,44,46 in the second group to generate light at a second light output. The second light output can be selected different from the first light output.

In a embodiment the second LEDs of the luminaires comprise RGB-LEDs and the control circuit is further arranged to generated the control signals for each of the

luminaires 41,43,45 to drive the RGB-LEDs in the first group to generate light having a first color point and each of the luminaires 42,44,46 to drive the RGB-LEDs in the second group to generate light at a second color point. The color of the RGB-LEDs or lit shade of the first group 41,43,45 of luminaires can be chosen different than the color or lit shade of the RGB-LEDs of second group 42,44,46. In this arrangement the lighting system can be used as a guidance system or to create different ambiances for people present in different lighted areas of the lighting system or to use different colors, for example red or green of the respective areas lighted by the first and second groups to communicate a message, for example, alert or safe, to the people present in the different areas.

Further embodiment of the lighting system may apply different digital technologies, well known to the person skilled in the art, that can be based on the principles set out in the embodiments described above to have the control device driving the luminaires individually or in groups.

Although illustrative embodiments of the present invention have been described with reference to the accompanying drawings, it is to be understood that the invention is not limited to these embodiments. Various changes or modifications may be effected by one skilled in the art without departing from the scope or the spirit of the invention as defined in the claims. Accordingly, reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearances of the phrases "in one embodiment" or "in an embodiment" in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, it is noted that the particular features, structures, or characteristics may be combined in any suitable manner in one or more embodiments.

CLAIMS:

1. A luminaire (1) comprising a housing provided with a first light exit window (4) and a first light source (5) arranged for functional lighting a surface according to a first light beam direction through the first light exit window, wherein the housing is provided with a translucent portion (3) and comprises a second light source (6) arranged to illuminate the translucent portion according to a second light beam direction non parallel to the first light beam direction.
2. A luminaire according to claim 1 wherein the translucent portion is arranged such that a normal of a tangential plane of the translucent portion is divergent from the direction of the light beam.
3. A luminaire according to claim 1 or 2, wherein the translucent portion is a circumferential portion of the housing.
4. A luminaire according to any one of claims 1-3, wherein the housing comprises a second window provided with the translucent portion.
5. A luminaire according to any one of the claims 1-4, wherein the luminaire comprises a control circuit (7) provided with a first input for receiving a control signal for driving the first and second light sources.
6. A luminaire according to any one of the claims 1-5 ,wherein the luminaire is provided with a light detector (25) arranged for generating a signal dependent on a light level of ambient light and the control circuit (7) is provided with a second input for receiving the generated signal and the control circuit is arranged to drive the second light source (6) dependent on the generated signal.

7. A luminaire according to claim 6 , wherein the light detector (25) is provided with a color filter (26) in order to generate the signal dependent on a light level of a portion of the ambient light having a wavelength in a predefined range.

8. A luminaire according to claim 6 or 7, wherein the light detector (25) is an image capturing device.

9. A luminaire according to claims 5 to 8, wherein the second light source (6) is an RGB-LED and the control circuit (7) is arranged to drive the RGB-LED at a color point.

10. A luminaire according claim 9, wherein the control circuit (7) is arranged to adjust the color point of the RGB-LED dependent on the generated signal of the light detector (25).

11. A lighting system comprising a plurality of luminaires (31,32,33,34,35,36) according to claim 1, wherein the lighting system comprise a control device (37) arranged for generating control signals for controlling the light sources (5,6) in the respective luminaires.

12. A lighting system according to claim 11 , wherein the luminaires are divided in a first group (41,43,45) and a second group (42,44,46) , the first group comprises at least one luminaire and the second group comprises at least one luminaire, being different from the luminaire(s) in the first group, whereby the control device (47) is further arranged to generate a first and second control signals to drive, respectively, the second light sources (6) of the luminaires in the first group at a first light output and to drive the second LEDs (6) of the luminaires in the second group at a second light output, the second light output having light features different than the lighting features of the first light output

13. A light system according to claim 11, wherein the second light sources of the luminaires of the first (41,43,45) and the second groups (42,44,46) comprise RGB-LEDs and the control device (47) is further arranged to generate, respectively, first and second control signals to drive the RGB-LEDs in the first group (41,43,45) at first color point and the RGB-LEDs in the second group (42,44,46) at a second color point, the second color point being different than the first color point.

Fig. 1

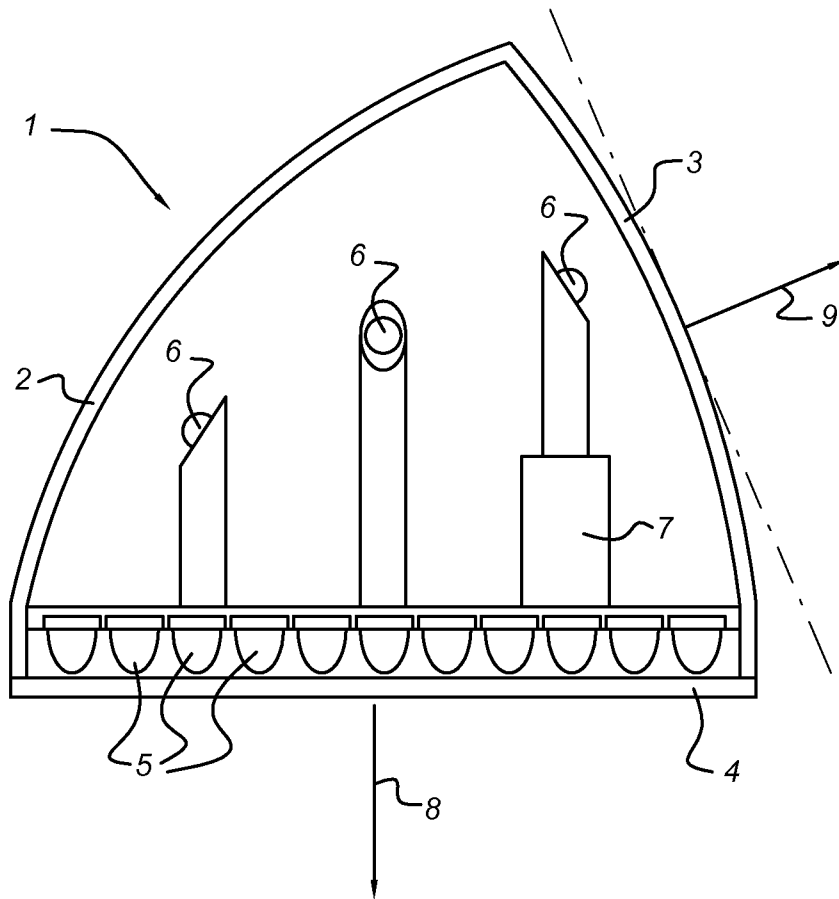


Fig. 2

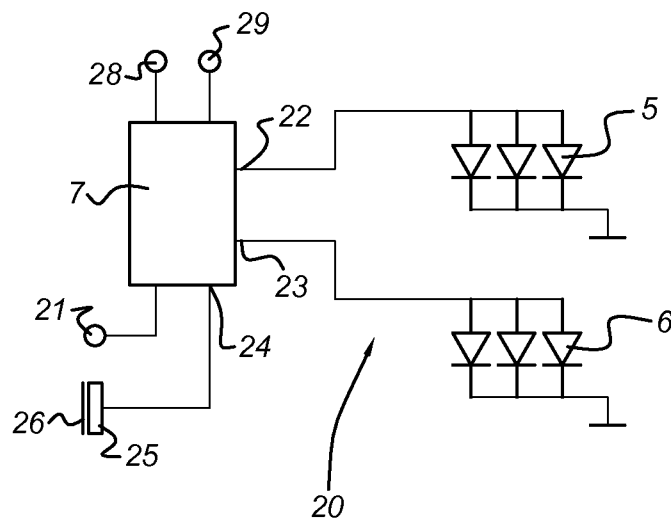


Fig. 3

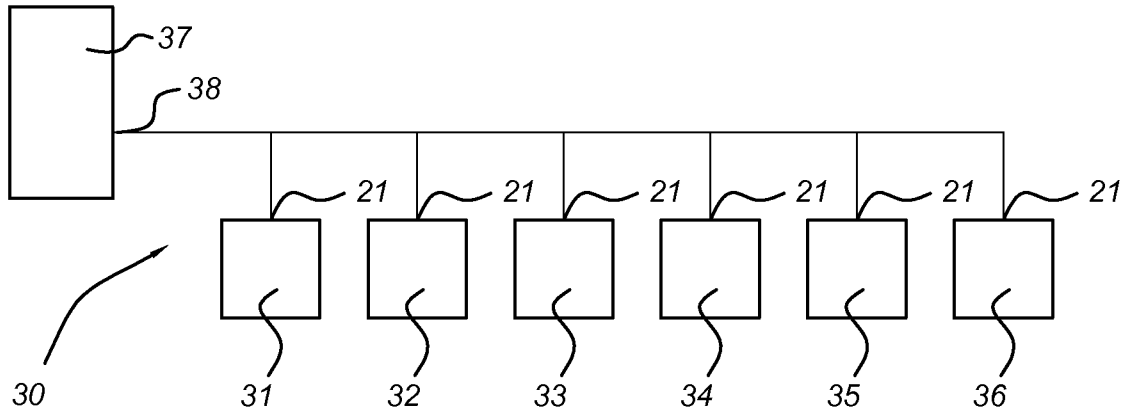
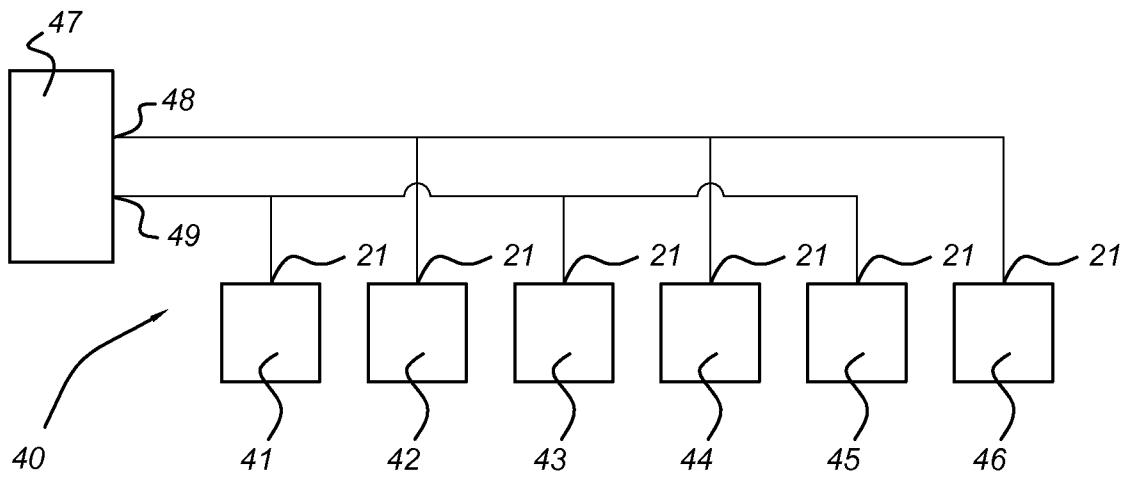


Fig. 4



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2012/055600

A. CLASSIFICATION OF SUBJECT MATTER

INV. F21S10/02 F21V3/00 F21V23/04 H05B33/08 H05B37/02
ADD. F21Y101/02 F21Y113/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F21S F21V H05B F21K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	----- WO 2004/055428 A1 (HIERZER A) 1 July 2004 (2004-07-01) the whole document	1-5
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X	----- US 7 052 157 B1 (LAU KENNETH H [US]) 30 May 2006 (2006-05-30) column 3, lines 15-21; figures	1-5
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Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

26 February 2013

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05/03/2013

Name and mailing address of the ISA/

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Berthommé, Emmanuel

INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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